CLAIMS:

1. A rotary engine comprising

a housing having a male rotor having a plurality of projecting lobes and a female rotor having a plurality of cavities, the male and female rotors being mounted for synchronous rotation about parallel axes such that during rotation successive lobes on the male rotor mate with successive cavities on the female rotor to define therewith a combustion chamber in which a mixture of air and fuel is compressed by the interaction of the lobe and the cavity during rotor rotation;

at least one exhaust port leading out of the housing for discharge of exhaust gases from the cavity of the female rotor following combustion and from the space between adjacent lobes of the male rotor following combustion; and

respective purge ports leading out of the housing downstream of the exhaust port in the direction of rotor rotation to facilitate discharge of residual exhaust gases from the cavity and inter-lobe space , the purge ports being associated with air inlet ports to admit air into the cavity and inter-lobe space in preparation for the subsequent combustion cycle.

2. The rotary engine as claimed in claim 1, comprising a separate exhaust port for the male and female rotor.

3. The rotary engine as claimed in claim 1 or claim 2, wherein the purge ports lead radially out of the housing to facilitate the discharge of the residual exhaust gases under the effect of centrifugal force generated by rotor rotation.

4. The rotary engine as claimed in any one of claims 1 to 3, wherein the purge ports extend over a relatively large arc of the order of 90° to 120°.

5. The rotary engine as claimed in any one of claims 1 to 4, wherein the intake ports are located in at least one of two end walls of the rotor housing.

6. The rotary engine as claimed in 5, wherein the intake ports are located in both end walls of the rotor housing.

7. The rotary engine as claimed in any one of claims 1 to 6, further comprising

a male tip seal for providing sealing contact between the housing and one of said projecting lobes, the male tip seal being provided on the projecting lobe and substantially running along the length of the male rotor; and

a first landing zone provided on the housing following the combustion chamber; wherein

during rotation of the male and female rotors the male tip seal ceases to contact the housing in the region of the combustion chamber, and the first landing zone provides for the gradual re-engagement between the male tip seal and the housing after the male tip seal passes the combustion chamber.

8. The rotary engine as claimed in claim 7, further comprising an element for biasing the male tip seal in a substantially radial direction with respect to the male rotor away from the male rotor towards the housing.

9. The rotary engine as claimed in claim 8, wherein the element for biasing the male tip seal comprises a leaf spring.

10. The rotary engine as claimed in any one of claims 7 to 9, wherein the male tip seal is mounted in a channel provided in the projecting lobe.

11. The rotary engine as claimed in claim 10, wherein the male tip seal has a shoulder portion that interacts with an undercut portion in the channel to limit the amount of movement of the male tip seal in a substantially radial direction with respect to the male rotor in the channel.

12. The rotary engine as claimed in any one of claims 7 to 11, wherein the first landing zone is substantially 4mm long.

13. The rotary engine as claimed in any one of claims 7 to 12, wherein the first landing zone is in the form of a curved ramp.

14. The rotary engine according to any one of claims 1 to 13, further comprising

a leading female tip seal for providing sealing contact between the housing and an inter-cavity portion of the female rotor located between successive cavities of the female rotor, the first female tip seal being provided adjacent a leading corner of the inter-cavity portion and substantially running along the length of the female rotor; and

a second landing zone provided on the housing following the combustion chamber; wherein

during rotation of the male and female rotors the leading female tip seal ceases to contact the housing in the region of the combustion chamber, and the second landing zone provides for the gradual re-engagement between the leading female tip seal and the housing after the leading female tip seal passes the combustion chamber.

15. The rotary engine as claimed in claim 14, further comprising an element for biasing the leading female tip seal in a substantially radial direction with respect to the female rotor away from the female rotor towards the housing.

16. The rotary engine as claimed in claim 15, wherein the element for biasing the leading female tip seal comprises a leaf spring.

17. The rotary engine as claimed in any one of claims 14 to 16, wherein the leading female tip seal is mounted in a leading channel provided in the inter-cavity portion.

18. The rotary engine as claimed in claim 17, wherein the leading female tip seal has a shoulder portion that interacts with an undercut portion in the leading channel to limit the

amount of movement of the leading female tip seal in a substantially radial direction with respect to the female rotor in the leading channel.

19. The rotary engine as claimed in any one of claims 14 to 18, wherein the second landing zone is substantially 4mm long.

20. The rotary engine as claimed in any one of claims 14 to 19, wherein the second landing zone is in the form of a curved ramp.

21. The rotary engine as claimed in any one of claims 14 to 20, further comprising a trailing female tip seal for providing a sealing contact between the housing and the inter-cavity portion between successive cavities of the female rotor, the trailing female tip seal being provided adjacent a trailing corner of the inter-cavity portion and substantially running along the length of the female rotor.

22. The rotary engine as claimed in claim 21, further comprising an element for biasing the trailing female tip seal substantially away from the female rotor towards the housing.

23. The rotary engine as claimed in claim 22, wherein the element for biasing the trailing female tip seal comprises a leaf spring.

24. The rotary engine as claimed in any one of claims 20 to 23, wherein the trailing female tip seal is mounted in a trailing channel provided in the inter-cavity portion.

25. The rotary engine as claimed in claim 24, wherein the trailing female tip seal has a shoulder portion that interacts with an undercut portion in the trailing channel to limit the amount of movement of the trailing female tip seal in a radial direction with respect to the female rotor in the trailing channel such that the trailing female tip seal does not substantially contact the second landing zone.

26. The rotary engine as claimed in any one of claims 1 to 25, further comprising a first seal provided in a first channel in the male rotor;

a second seal provided in a second channel of the male rotor, an end of the first channel meeting an end of the second channel; and

a blocking element that is provided where the end of the first channel meets the end of the second channel for preventing exhaust gases entering these channels between the seals and the male rotor and from travelling from one of the first channel and the second channel to the other of the first channel and the second channel.

27. The rotary engine as claimed in claim 26, further comprising a blocking biasing element for biasing the blocking element towards the housing away from the male rotor.

28. The rotary engine as claimed in claim 27, wherein the blocking biasing element is a coil spring.

29. The rotary engine as claimed in any one of claims 26 to 28, wherein the blocking element is substantially a cylindrical shaped stopper.

30. The rotary engine as claimed in any one of claims 26 to 28, wherein the blocking element is substantially a piston.

31. The rotary engine as claimed in any one of claims 1 to 25, further comprising a first seal provided in a first channel in the female rotor;

a second seal provided in a second channel of the female rotor, an end of the first channel meeting an end of the second channel; and

a blocking element that is provided where the end of the first channel meets the end of the second channel for preventing exhaust gases entering these channels between the seals and the female rotor and from travelling from one of the first channel and the second channel to the other of the first channel and the second channel.

32. The rotary engine as claimed in claim 31, further comprising a blocking biasing element for biasing the blocking element towards the housing away from the female rotor.

33. The rotary engine as claimed in claim 32, wherein the blocking biasing element is a coil spring.

34. The rotary engine as claimed in any one of claims 31 to 33, wherein the blocking element is substantially a cylindrical shaped stopper.

35. The rotary engine as claimed in any one of claims 31 to 34, wherein the blocking element is substantially a piston.

36. A rotary engine comprising

at least one rotor enclosed in a housing, the rotor having at least one tip that contacts a portion of the housing during rotation, the tip ceasing to contact the housing in the region of a combustion chamber as the rotor the tip passes the combustion chamber during rotation of the rotor;

wherein

a landing zone is provided in the housing to provide for the gradual re-engagement between the tip and said portion of the housing after the tip passes the combustion chamber.

38. The rotary engine as claimed in claim 37, further comprising an element for biasing the tip substantially radially with respect to the rotor away from the rotor towards the housing.

39. The rotary engine as claimed claim 38, wherein the element for biasing the tip comprises a leaf spring.

40. The rotary engine as claimed in any one of claims 37 to 39, wherein the tip is mounted in a channel provided in the rotor.

41. The rotary engine as claimed in claim 40, wherein the tip has a shoulder portion that interacts with an undercut portion in the channel to limit the amount of movement of the tip in a substantially radial direction with respect to the rotor in the channel.

42. The rotary engine as claimed in any one of claims 37 to 41, wherein the landing zone is substantially 4mm long.

42. The rotary engine as claimed in any one of claims 37 to 42, wherein the landing zone is in the form of a curved ramp.

43. A rotary engine comprising

at least one rotor;

a first seal provided in a first channel in the rotor;

a second seal provided in a second channel of the rotor, an end of the first channel meeting an end of the second channel; and

a blocking element that is provided in the region where the end of the first channel meets the end of second channel for preventing exhaust gases generated during a combustion cycle of the rotary engine from entering said channels between the seals and the rotor.

44. The rotary engine as claimed in claim 43, further comprising a blocking biasing element for biasing the blocking element towards the housing away from the rotor.

45. The rotary engine as claimed in claim 44, wherein the blocking biasing element is a coil spring.

46. The rotary engine as claimed in any one of claims 43 to 45, wherein the blocking element is substantially a cylindrical shaped stopper.

47. The rotary engine as claimed in any one of claims 43 to 46, wherein the blocking element is substantially a piston.